

**U.S. FISH AND WILDLIFE SERVICE  
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: Etheostoma susanae (Jordan and Swain)

COMMON NAME: Cumberland darter

LEAD REGION: 4

INFORMATION CURRENT AS OF: October 2005

**STATUS/ACTION:**

☐ Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☐ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☐ 12-month warranted but precluded - FR date:

☐ Did the petition request a reclassification of a listed species?

**FOR PETITIONED CANDIDATE SPECIES:**

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, almost our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations, and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov/>).

☒ Listing priority change

Former LP: 6

New LP: 5

Date the species first became a Candidate (as currently defined): 10/25/1999

- \_\_\_ Candidate removal: Former LP: \_\_\_
- \_\_\_ A - Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
  - \_\_\_ U - Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
  - \_\_\_ F - Range is no longer a U.S. territory.
  - \_\_\_ I - Insufficient information exists on biological vulnerability and threats to support listing.
  - \_\_\_ M - Taxon mistakenly included in past notice of review.
  - \_\_\_ N - Taxon may not meet the Act's definition of "species."
  - \_\_\_ X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Fish, Percidae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Kentucky and Tennessee

CURRENT STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Kentucky and Tennessee

LAND OWNERSHIP: Extant populations of the Cumberland darter occur in watersheds that are roughly 60% privately owned and 40% publicly owned (U.S. Forest Service, Daniel Boone National Forest [DBNF]). The U.S. Forest Service's ownership is typically fragmented and often occurs on only one side of the stream. One exception to this trend is the watershed of Bunches Creek in Whitley County, Kentucky; approximately 90 percent of its watershed occurs within the DBNF.

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LEAD FIELD OFFICE CONTACT: Kentucky Field Office, KY – Dr. Michael A. Floyd, (502) 695-0468, Mike\_Floyd@fws.gov

## BIOLOGICAL INFORMATION

### Species Description

The Cumberland darter, *Etheostoma susanae*, is a small fish reaching about three inches in length. It has straw-yellow background body color with brown markings forming six, evenly-spaced, dorsal (back) saddles and a series of X-, C-, or W-shaped markings on its sides. During spawning season, the overall body color of breeding males darkens, and the side markings become obscure or appear as a series of blotches (adapted from Etnier and Starnes 1993).

### Taxonomy

Starnes and Starnes (1979), distinguished the Cumberland darter from the johnny darter, *E. nigrum*, by the following characteristics: the top of head, opercles (gill coverings), and mid-belly of the Cumberland darter are devoid of scales, and the pre-orbital stripe (a dark stripe extending from the eye to the upper lip) on the Cumberland darter is usually interrupted at the nostrils (nares). Strange (1998a, 1998b, 1994) recommended that *E. nigrum susanae* be elevated to specific status based on the results of his mitochondrial DNA analysis (distinct mitochondrial DNA haplotypes) of *E. nigrum susanae* and *E. n. nigrum*. The subspecies *E. nigrum susanae* was recognized as a valid species, *E. susanae* (Cumberland darter), by Nelson (2004) based on the work of Strange (1998a, 1998b) and a personal communication with W. C. Starnes (Curator of Fishes, North Carolina Museum of Natural Sciences, May 2000), who suggested the common name. We have carefully reviewed the available taxonomic information summarized above to reach the conclusion that the species is a valid taxon.

### Habitat/Life History

The Cumberland darter inhabits shallow water in pools and runs of headwater streams with stable sand, silt, or sand-covered bedrock substrata. The species is not found in areas with cobble or boulder substrata. All specimens that have been collected in recent years have been found in less than 15 centimeters (6 inches) of water (O'Bara 1988; Laudermilk and Cicerello 1998).

### Historic Range/Distribution

The Cumberland darter is endemic to the upper Cumberland River system, above Cumberland Falls, Kentucky and Tennessee (Etnier and Starnes 1993; O'Bara 1988).

### Current Range/Distribution

Although the Cumberland darter was recorded as abundant by Jordan and Swain (1883), it is now considered to be rare and extremely restricted in range. Recent surveys by O'Bara (1988) and Laudermilk and Cicerello (1998) indicate that the Cumberland darter is restricted to short reaches of 16 small streams in the upper Cumberland River system in Whitley and McCreary Counties, Kentucky and only two streams in Tennessee - one in Scott County (Jellico Creek) and one in Campbell County (Capuchin Creek). The species has apparently been extirpated from Little Wolf Creek, Whitley County, Kentucky, where it was recorded by Jordan and Swain (1883), and Gum Fork, Scott County, Tennessee where it was recorded by Shoup and Peyton (1940). In addition, O'Bara (1988) recorded the Cumberland darter from two sites in the mainstem of the Cumberland River, but recent efforts to collect the species from these sites have been unsuccessful (Ron Cicerello, Kentucky Nature Preserves Commission, Frankfort, Kentucky, personal communication, 1999). Previous records of the species in the Poor Fork portion of the Cumberland River drainage in Letcher and Harlan Counties, Kentucky (Starnes and Starnes 1979) have been determined to be the johnny darter, *E. nigrum*, based on a genetics study conducted by Strange (1998). Records of the species from Martins Fork, Harlan County, Kentucky (Starnes and Starnes 1979) are also believed to be misidentifications; however, efforts to collect individuals from Martins

Forks for genetic studies have been unsuccessful, indicating that whichever taxon occurred in this system has apparently been extirpated.

#### Population Estimates/Status

All eighteen of the surviving occurrences of the Cumberland darter are restricted to short stream reaches, with the majority believed to be restricted to less than one mile of stream.

These occurrences are thought to form six population clusters, which are isolated from one another by poor quality habitat, impoundments, or natural barriers.

#### THREATS:

##### A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Siltation, primarily from coal mining activities, but also from forestry, agricultural activities, road construction, and urban development, appears to be the major factor contributing to the decline of the Cumberland darter throughout its range and the most significant threat to the species' continued existence (O'Bara 1988). The habitat in which the species is primarily found is extremely susceptible to the effects of siltation. The low to moderate gradient, low current velocity, and backwater nature of this habitat leads to this susceptibility. O'Bara (1988) reported that only 15 of the 70 sites that he sampled for the Cumberland darter had not been impacted by siltation associated with mining and other poorly implemented land disturbance activities.

Practices that contribute sediment discharges into a stream system change the erosion or sedimentation pattern, which can lead to the destruction of riparian vegetation, bank collapse, and increased water turbidity and temperature. Excessive sediments are believed to impact the habitat of darters and associated fish species, by making it unsuitable for feeding and reproduction. Sediment has been shown to abrade and or suffocate bottom dwelling organisms, reduce aquatic insect diversity and abundance, and, ultimately, negatively impact fish growth, survival, and reproduction (Waters 1995).

##### B. Overutilization for commercial, recreational, scientific, or educational purposes.

The specific areas inhabited by the Cumberland darter are not presently known to the general public; and until a proposed rule is published, they will be unaware of this species' presence in the upper Cumberland River system. As a result, collection of the Cumberland darter by the general public has not been a problem. However, this species exists only in small, restricted areas. Once its rarity becomes known, it may become attractive to collectors. Although scientific collecting is not presently identified as a threat, collection by private and institutional collectors could pose a threat. Federal protection could help to reduce the negative impact of illegal or inappropriate take.

##### C. Disease or predation.

Although the Cumberland darter is undoubtedly consumed by predators, predation by

naturally occurring predators is a normal aspect of the population dynamics and is not considered to currently pose a threat to the species.

D. The inadequacy of existing regulatory mechanisms.

The Cumberland johnny darter does not currently have any official status in the state of Tennessee. The Kentucky State Nature Preserves Commission (2005) considers the species to be endangered within Kentucky.

Both Tennessee and Kentucky prohibit the collection of the fish for scientific purposes without a valid state-issued collecting permit. However, this requirement does not provide any protection to the species' habitat.

In seven of the streams where the Cumberland darter still occurs, the species is indirectly provided some protection from federal actions and activities through the Endangered Species Act, because these streams also support the federally threatened blackside dace (*Phoxinus cumberlandensis*). In addition, one of these seven streams, Marsh Creek, supports a population of the federally endangered Cumberland elktoe mussel (*Alasmidonta atropurpurea*). The nine remaining streams supporting populations of the Cumberland darter are not afforded this protection. Federal listing will provide additional protection for this species throughout its range by requiring Federal permits in order to take the species and by requiring Federal agencies to consult with the Service when activities they fund, authorize, or carry out may affect the species.

E. Other natural or manmade factors affecting its continued existence.

The existing Cumberland darter populations are small in size and range, and are geographically isolated from one another. This patchy distribution pattern of populations in short stream reaches and small population size makes them much more susceptible to extirpation from single catastrophic events (such as toxic chemical spills). It also reduces their ability to recover from smaller impacts to their habitat or populations. Furthermore, this level of isolation makes natural repopulation of unoccupied habitat impossible without human intervention.

Geographic isolation also prohibits the natural interchange of genetic material between populations, and small population size reduces the reservoir of genetic diversity within populations. This can lead to inbreeding depression (Avis and Hambrick 1996). It is likely that some of the Cumberland darter populations are below the effective population size required to maintain long-term genetic and population viability (Soule 1980).

## CONSERVATION MEASURES PLANNED OR IMPLEMENTED

There are no written agreements currently in place for this species or its habitat. The Service has been working with biologists with the U.S. Forest Service, and the states of Kentucky and Tennessee, as well as personnel with the University of Tennessee, Knoxville, Tennessee, to identify threats and potential recovery measures for the

Cumberland darter.

**SUMMARY OF THREATS** (including reasons for addition or removal from candidacy, if appropriate)

The primary threat to the Cumberland darter is the siltation of instream habitats caused by coal mining activities, silvicultural practices, road construction, and urban development (O'Bara 1988). Increased sedimentation alters the natural hydrology of stream systems, causing bank scour, bank collapse, increased turbidity, and elevated stream temperatures. Excessive siltation can abrade and or suffocate bottom dwelling organisms, reduce aquatic insect diversity and abundance, and, ultimately, negatively impact fish growth, survival, and reproduction (Waters 1995).

The small size and range of Cumberland darter populations make them much more susceptible to extirpation from single catastrophic events (such as toxic chemical spills) and reduces their ability to recover from smaller impacts to their habitat or populations. Without human intervention, natural repopulation of unoccupied habitat is highly unlikely. Isolation of small populations also prohibits the natural interchange of genetic material between populations, reducing the reservoir of genetic diversity within populations. This can lead to inbreeding depression (Avis and Hambrick 1996). It is likely that some of the Cumberland darter populations are below the effective population size required to maintain long-term genetic and population viability (Soule 1980).

For species that are being removed from candidate status:

\_\_\_ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

**RECOMMENDED CONSERVATION MEASURES**

Conservation measures for the Cumberland darter should be concentrated in those watersheds where populations still occur and should be focused primarily on the protection and restoration of the existing water and habitat quality of these systems. Specific conservation efforts should include livestock exclusion, development of alternate water sources, riparian tree and shrub plantings, bioengineered bank repair, culvert removal, and installation of grade stabilization structures. Degraded areas located outside of, but in close proximity to, the species' current range should also be improved, allowing for the expansion of existing populations and reestablishment of extirpated populations.

Implementation of conservation efforts will require the cooperation and assistance of private citizens, federal and state agencies, municipalities, and industry. In order to achieve conservation goals, the Service should pursue the development of candidate conservation agreements and candidate conservation agreements with assurances with these potential partners. Conservation efforts should be augmented through additional

research on the species' current distribution, life history, environmental requirements, and movement patterns.

LISTING PRIORITY (place \* after number)

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
<b>High</b>	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	<b>Non-imminent</b>	Monotypic genus	4
		<b>Species</b>	<b>5*</b>
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

*Magnitude:* All sixteen of the surviving occurrences of the Cumberland darter are restricted to short stream reaches, with the majority believed to be restricted to less than one mile of stream. These sixteen occurrences are thought to form six population clusters, which are isolated from one another by poor quality habitat, impoundments, or natural barriers. Collectively, these factors are serious and significant impediments to the survival of the Cumberland darter and would be considered of “High” magnitude.

*Imminence:* Federal and state water quality laws have reduced water quality threats to some degree. Non-point pollution threats and modification of reach geomorphology and hydrology are cumulative and gradual. Therefore, these factors would be considered “Non-imminent”.

**Rationale for Change in Listing Priority Number (insert if appropriate):** The listing priority number was modified due to a change in taxonomic status, not because of a change in threat magnitude or imminence. Strange (1998a, 1998b, 1994) provided molecular evidence supporting recognition of the subspecies *E. nigrum susanae* (Jordan and Swain 1883) as a valid species. The American Fisheries Society (Nelson 2004) relied on this evidence provided by Strange (1998b), as well as personal communications with W. C. Starnes (Curator of Fishes, North Carolina Museum of Natural Sciences, May 2000, who suggested the common name) and R. M. Strange (Great Lakes Genetics

Laboratory, University of Toledo, March 2002), in making the decision to recognize the taxon as a valid species, *E. susanae* (Cumberland darter).

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. Non-point pollution threats and modification of reach geomorphology and hydrology are cumulative and gradual.

DESCRIPTION OF MONITORING: No current monitoring efforts are known. The Kentucky Department of Fish and Wildlife Resources (in cooperation with the Service's Kentucky Field Office) is planning a basin-wide survey for Cumberland darter during the summer of 2006. All streams known to support the species will be surveyed, as well as other sites that have suitable habitat and water quality conditions.

#### COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: Kentucky (Kentucky Department of Fish and Wildlife Resources and Kentucky State Nature Preserves Commission), Tennessee (Tennessee Wildlife Resources Agency).

Indicate which State(s) did not provide any information or comments: None

#### LITERATURE CITED:

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- Strange, R. M. 1994. Reconsideration of the taxonomic status of the Cumberland Johnny darter, Etheostoma nigrum susanae. mtDNA analysis and the importance of speciation concepts for conservation biology. Report submitted to the U.S. Fish and Wildlife Service, Asheville, North Carolina. 30pp.
- Strange, R.M. 1998a. Analysis of a putative hybrid zone between Etheostoma susanae and E. nigrum in the Poor Fork of the Cumberland River, Eastern Kentucky. Final report to United States Department of the Interior, Fish and Wildlife Service, Asheville, NC. 9pp.
- Strange, R. M. 1998b. Mitochondrial DNA variation in Johnny darters (Pisces: Percidae) from Eastern Kentucky supports stream capture for the origin of upper Cumberland River fishes. American Midl. Nat. 140:96-102.
- Waters, T. F. 1995. Sediment in streams: sources, biological effects, and control. American Fisheries Soc. Monograph 7, Bethesda, Maryland.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Jeffrey M. Fleming 11/16/2005  
Acting Regional Director, Fish and Wildlife Service Date



Concur: \_\_\_\_\_ August 23, 2006  
Acting Director, Fish and Wildlife Service Date

Do Not Concur: \_\_\_\_\_  
Director, Fish and Wildlife Service Date

Date of annual review: October 2005

Conducted by: Conway, Arkansas Field Office